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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/558,360	11/25/2005	Takuma Hashimoto	P28811	3905

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EXAMINER	
KHOSRAVIANI, ARMAN	
ART UNIT	PAPER NUMBER
2809	

NOTIFICATION DATE	DELIVERY MODE
08/06/2007	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/558,360	HASHIMOTO ET AL.	
	Examiner	Art Unit	
	Arman Khosraviani	2809	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 November 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,21 and 25-28* is/are rejected.

7)☒ Claim(s) *15-20 and 22-24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 November 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following minor informalities:

   i. (pg. 3/ll. 18) replace "has following" with – has the following –

   ii. (pg. 8/ll. 6) replace "though" with – through –

Drawings

2. Figure 1 (as disclosed on pg. 2/ll. 20) should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –.

(e) the invention was described in-
(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent; or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, *except* that an international application filed under the treaty defined in section 351(a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English.

4. Claims 1-2, 5, 8-10 are rejected under 35 U.S.C. 102(e) as being anticipated by Harrah et al. (US 6,498,355).

Regarding claim 1, Harrah disclose (e.g. fig. 2, see also col. 2/ll. 49 through col. 5/ll. 39) a light-emitting device comprising: a submount comprising a mount base 30, at least one light-emitting diode chip 28 mounted thereon and electrically conducting lines 34, 36 formed on the mount base 30 to be connected electrically to the light-emitting diode chip 28; and a first plate 8, 10, 6 for heat transfer comprising a metallic plate 6; wherein a first plane of the mount base 30 opposed to the metallic plate 6 of the first plate is bonded thermally to said first plate.

Regarding claim 2, Harrah disclose (e.g. fig. 2, see also col. 2/ll. 49 through col. 5/ll. 39) a light-emitting device above, wherein said first plate 8, 10, 6 for heat transfer comprises the metallic plate 6, an insulator layer 10 formed thereon, and an electrical connection pattern layer 8 formed on the insulator layer 10, the first plate of the mount base 30 of said submount is bonded thermally to a portion of the metallic plate 6 of said first plate exposed at a side opposed to said submount by removing the insulator layer and the pattern layer, and the electrically conducting lines 34, 36 of said submount are

connected electrically to the electrical connection pattern layer 8 of said first plate (by vias 38, 40).

Regarding claim 5, Harrah disclose (e.g. figs. 1 or 2, see also col. 6/lls. 16-36) a light-emitting device above, wherein the light-emitting diode chip is mounted face down to said mount base with a bonding material.

Regarding claim 8, Harrah disclose (e.g. fig. 2, see also col. 2/ll. 49 through col. 5/ll. 39) a light-emitting device above, further comprising a metallic member 24 provided between said mount base and said first plate for heat transfer, said metallic member making bond thermally with the mount base of said submount and with the exposed portion of the metallic plate of said first plate.

Regarding claim 9, Harrah disclose (e.g. fig. 2, see also col. 2/ll. 49 through col. 5/ll. 39) a light-emitting device above, wherein said metallic member 24 is a bonding member to bond the mount base of said submount to the exposed portion of the metallic plate of said first plate.

Regarding claim 10, Harrah disclose (e.g. fig. 2, see also col. 4/ll. 36-54) a light-emitting device above, wherein said mount base is made of a ceramic material.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made

to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in **Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459 (1966)**, that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: ***(See MPEP Ch. 2141)***

a. Determining the scope and contents of the prior art;
b. Ascertaining the differences between the prior art and the claims in issue;
c. Resolving the level of ordinary skill in the pertinent art; and
d. Evaluating evidence of secondary considerations for indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 3-4, and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrah et al. (US 6,498,355) in view of Schneider (US 5,172,301).

Regarding claim 3, Harrah remain as previously applied. It is noted that Harrah do not teach a light-emitting device above, wherein at least one of said mount base and said first plate for heat transfer has a protrusion having a plane to bond thermally to the other of said mount base and said first plate.

However, Schneider teach (e.g. figs. 2 or 6, see also col. 2/ll. 62 through col. 5/ll. 2) a light-emitting device above, wherein at least one of said mount base and said first plate for heat transfer 314 has a protrusion 314b having a plane to bond thermally to the

other of said mount base 306 and said first plate for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein at least one of said mount base and said first plate for heat transfer has a protrusion having a plane to bond thermally to the other of said mount base and said first plate as disclosed by Schneider for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 4, Harrah remain as previously applied. It is noted that Harrah do not teach a light-emitting device above, wherein one of said mount base and said first plate for heat transfer has a protrusion while the other has a recess, so that the protrusion fits into the recess to bond thermally between them.

However, Schneider teach a light-emitting device above, wherein one of said mount base 306 and said first plate for heat transfer has a protrusion 314b while the other has a recess, so that the protrusion fits into the recess to bond thermally between them for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein one of said mount base and said first plate for heat transfer has a protrusion while the other has a recess, so that the protrusion fits into the recess to bond thermally between them as disclosed by Schneider for the same benefit of

providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 6, Harrah remain as previously applied. It is noted that Harrah do not teach a light-emitting device above, wherein the mount base comprises throughholes covered by a layer made of a material having a higher thermal conductivity than the mount base.

However, Schneider teach (e.g. fig. 2 and 4, see also col. 3/lls. 50-68 and col. 4/lls. 1-8 and 43-57) a light-emitting device above, wherein the mount base comprises throughholes 312 covered by a layer made of a material having a higher thermal conductivity than the mount base for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein the mount base comprises throughholes covered by a layer made of a material having a higher thermal conductivity than the mount base as disclosed by Schneider for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrah et al. (US 6,498,355) in view of Schneider (US 5,172,301) as applied to claims 3-4 and 6 and in further view of Sugaya et al. (US 6,784,530).

Regarding claim 7, Harrah in combination with Schneider remain as previously applied. It is noted that the combination of Harrah and Schneider do not teach the light-

emitting device above, wherein said throughholes are filled with a material having a higher thermal conductivity than the mount base.

However, Sugaya teach (e.g. figs. 2C-2E, see also col. 9/lls. 8-48) a light-emitting device above, wherein said throughholes 204 are filled with a material having a higher thermal conductivity than the mount base for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Schneider in combination with Harrah, wherein said throughholes are filled with a material having a higher thermal conductivity than the mount base as disclosed by Sugaya for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

7. Claims 11-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrah et al. (US 6,498,355) in view of Masahiro (JP 358201383) (of record).

Regarding claim 11, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein at least one groove is provided on the first plane of said mount base.

However, Masahiro teaches (see Abstract) a light-emitting device above, wherein at least one groove is provided on the first plane of said mount base (a semiconductor light-emitting device comprising a groove on a plane opposite to the substrate to which the light-emitting device is bonded) for the same benefit of providing a simple structure

to improve heat transfer for a light-emitting device with an LED. Furthermore, the groove is filled with thermally highly conductive brazing material to increase the heat removal rate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein at least one groove is provided on the first plane of said mount base as disclosed by Masahiro for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 12, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein each of said at least one groove comprises a bottom and two sides, a width between the two sides increasing in a direction from the bottom toward an opening of said each of said at least one groove.

However, Masahiro teaches (see Abstract) a light-emitting device above, wherein each of said at least one groove comprises a bottom and two sides, a width between the two sides increasing in a direction from the bottom toward an opening of said each of said at least one groove (since the groove is obtained by an etching process, the shape is obtained when the parameters of the etching are set accordingly) for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein each of said at least one groove comprises a bottom and two sides, a

width between the two sides increasing in a direction from the bottom toward an opening of said each of said at least one groove as disclosed by Masahiro for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 13, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, further comprising a layer formed on said at least one groove made of a material having a thermal conductivity higher than said mount base.

However, Masahiro teaches (see Abstract) a light-emitting device above, further comprising a layer formed on said at least one groove made of a material having a thermal conductivity higher than said mount base for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, further comprising a layer formed on said at least one groove made of a material having a thermal conductivity higher than said mount base as disclosed by Masahiro for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 14, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein the light-emitting diode chip is mounted face down to the mount base with a bonding material, and said at least one

groove is formed between the bonding material and the first plane of the mount base to bond thermally to the exposed portion of the metallic plate.

However, Masahiro teaches (see Abstract) a light-emitting device above, wherein the light-emitting diode chip is mounted face down to the mount base with a bonding material, and said at least one groove is formed between the bonding material and the first plane of the mount base to bond thermally to the exposed portion of the metallic plate for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, further comprising a layer formed on said at least one groove made of a material having a thermal conductivity higher than said mount base as disclosed by Masahiro for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

8. Claims 15 through 20 are objected to as being dependent upon a rejected base claims 1, 11 and 14, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claims 21, and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrah et al. (US 6,498,355) in view of Tsuji et al. (JP 404048740) (of record). Regarding claim 21, Harrah remain as previously applied. It is noted that the Harrah do

not teach a light-emitting device above, further comprising a second plate for heat transfer bonded thermally to a second plane of said submount different from the first plane thereof.

However, Tsuji teach (see Abstract) a light-emitting device above, further comprising a second plate 7 for heat transfer bonded thermally to a second plane of said submount 2 different from the first plane 1 thereof for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, further comprising a second plate for heat transfer bonded thermally to a second plane of said submount different from the first plane thereof as disclosed by Tsuji for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 25, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein one of said first and second planes has an opening above said at least one light-emitting diode chip mounted on the mount base.

However, Tsuji teach (see Abstract) a light-emitting device above, wherein one of said first and second planes has an opening above said at least one light-emitting diode chip mounted on the mount base for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein one of said first and second planes has an opening above said at least one light-emitting diode chip mounted on the mount base as disclosed by Tsuji for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 26, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base.

However, Tsuji teach (see Abstract) a light-emitting device above, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base as disclosed by Tsuji for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 27, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein the heat transfer material is bonded with at least one of said first and second plates.

However, Tsuji teach (see Abstract) a light-emitting device above, wherein the heat transfer material is bonded with at least one of said first and second plates for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein the heat transfer material is bonded with at least one of said first and second plates as disclosed by Tsuji for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Regarding claim 28, Harrah remain as previously applied. It is noted that the Harrah do not teach a light-emitting device above, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base.

However, Tsuji teach (see Abstract) a light-emitting device above, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make a light-emitting device above as disclosed by Harrah, wherein said mount base includes a heat transfer material embedded therein, the heat transfer material having thermal conductivity higher than a main body of the mount base as disclosed by Tsuji for the same benefit of providing a simple structure to improve heat transfer for a light-emitting device with an LED.

10. Claims 22 through 24 are objected to as being dependent upon a rejected base claims 1 and 21, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Schneider (US 5,172,301), Lumbard (US 5,311,407), Stopa et al. (US 6,318,886), Sakamoto et al. (US 2001/0052600), Sakamoto et al. (US 2001/0050370), Roberts et al. (US 6,335,548), Roberts et al. (US 2002/0004251), Harrah et al. (US 6,498,355), Sakamoto et al. (US 2003/0022407), Sakamoto et al. (US 2003/0170922), Yoshimura et al. (US 6,706,546), Panella et al. (US 6,885,563), Harrah (US 6,936,855) show devices similar to the instant invention.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Arman Khosraviani whose telephone number is 571-272-2554. The examiner can normally be reached on Monday to Friday, 7:30a - 5:00p (Eastern Time).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Angela Ortiz can be reached on 571-272-1206. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Arman Khos.

AK

LEONARDO ANDUJAR
PRIMARY EXAMINER

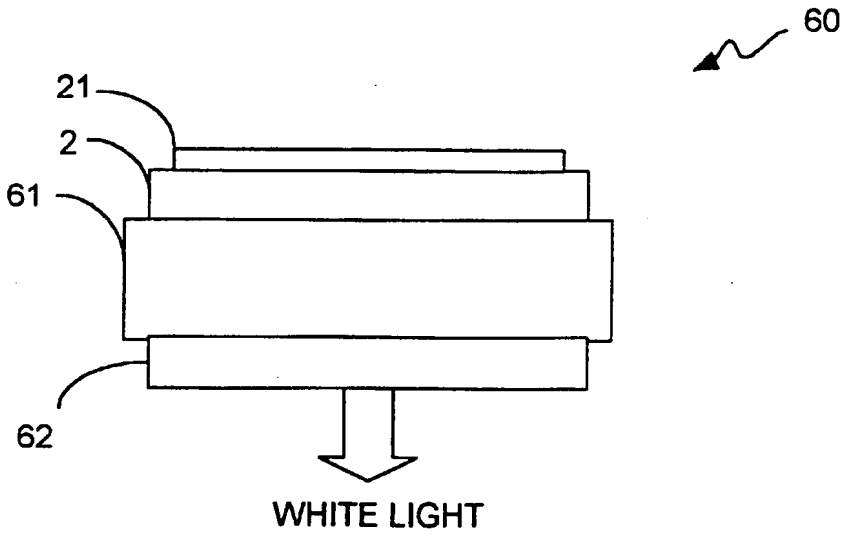

Fig. 6

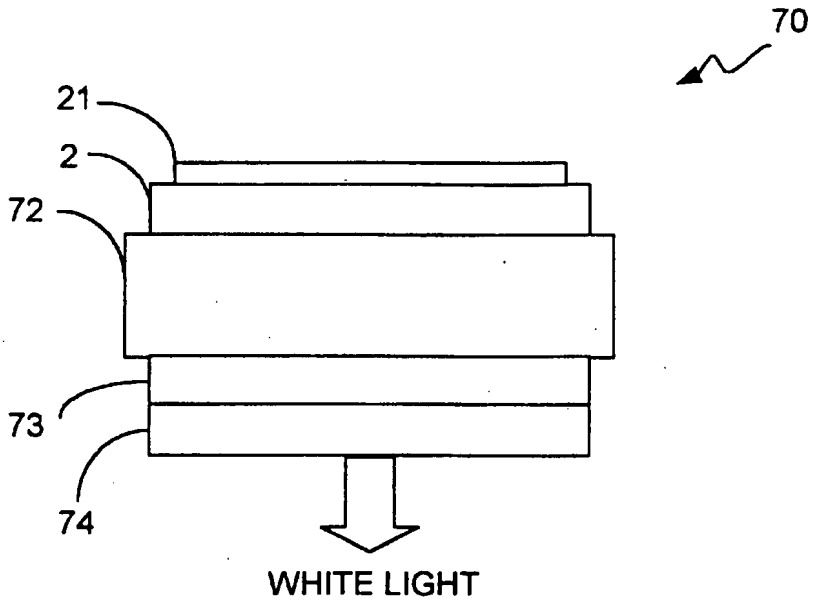

Fig. 7